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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/502,126	02/10/2000	HARI PONNEKANTI	AMAT/3984/PDD/LOW K/JW	4779

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APPLIED MATERIALS, INC.
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EXAMINER

MOORE, KARLA A

ART UNIT

PAPER NUMBER

1763

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/502,126

Applicant(s)

PONNEKANTI ET AL.

Examiner

Karla Moore

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22, 62 and 63 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-22, 62 and 63 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 February 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 04/03/02 is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5, 9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 20 and 21 recite the limitation "each substrate stripping chamber". There is insufficient antecedent basis for this limitation in the claims. Examiner assumes that claim 20 was meant to depend from claim 13 and therefore examined the application based on this assumption.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

4. Claims 1, 3 and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,259,881 to Edwards et al.
5. Edwards et al. disclose an apparatus for processing substrates in Figure 1, comprising: one or more transfer chambers (12,14); a substrate handling member (20) disposed in each of the one or more

transfer chambers; one or more processing chambers (20,22,24,28,30) defining at least one isolated processing region therein, wherein each processing region is connected to the one or more transfer chambers; one or more load lock chambers (32,34) in communication with the one or more transfer chambers; and one or more multi-slot substrate pre-heating modules (42,44; column 7, rows 1-3) in communication with the one or more transfer chambers. Additionally, a vacuum pump is in fluid communication with the load lock chamber (column 6, rows 57-63) and the one or more processing chambers (column 10, rows 20).

6. Claims 1-4 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,512,320 to Turner et al.

7. Turner et al. disclose an apparatus (10) for processing substrates in Figure 1, comprising: one or more transfer chambers (12); a substrate handling member (22) disposed in each of the one or more transfer chambers; one or more processing chambers (40,42,44,46) defining at least one isolated processing region therein, wherein each processing region is connected to the one or more transfer chambers; one or more load lock chambers (14A,14B) in communication with the one or more transfer chambers; and one or more multi-slot substrate pre-heating modules (28; column 4, rows 21-25) in communication with the one or more transfer chambers. Additionally, a vacuum pump is in fluid communication with the entire apparatus, including the load lock chamber and the one or more processing chambers (column 3, rows 19-20). The apparatus further comprises one or more multi-slot cooling stations disposed within the loadlock chamber (column 3, rows 30-33).

8. With respect to claim 11, Turner et al. teach changes to the disclose invention, including the combination of combining heating and cooling chambers. As the cooling chambers are already integral with the loadlock chambers, this teaching anticipates Applicant's claim of one or more multi-slot pre-heating modules disposed within the loadlock chamber, as the loadlock chamber could house a cooling module or a cooling/heating combination module.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al. as applied to claims 1-4 and 11 above, and further in view of U.S. Patent No. 6,214,120 to Kim.

11. Turner et al. disclose the invention substantially as claimed.

12. However, Turner et al. fail to teach a processing chamber comprising two isolated regions or each processing region including a gas distribution assembly disposed therein and each gas distribution assembly sharing process gases from one or more gas sources.

13. Kim discloses a processing chamber (Figure 2) comprising two processing regions, a gas distribution assembly (not numbered) in each region and each assembly sharing process gases from one or more sources for the purpose of configuring a machine with a small footprint and increased throughput, as compared to a single region system (column 1, rows 50-60).

14. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided an apparatus with two processing regions, a gas distribution assembly in each region and each assembly sharing process gases from one or more sources in Turner et al. in order to configure a machine with a small footprint and increased throughput as taught by Kim.

15. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al. as applied to claims 1-4 and 11 above, and further in view of U.S. Patent No. 5,587,038 to Cecchi et al.

16. Turner et al. disclose the invention substantially as claimed.

17. However, Turner et al. fail to teach the invention comprising a remote plasma system having an RF generator connected to and in fluid communication with each processing region.

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18. Cecchi et al. teach the use of a remote plasma system in a processing chamber having an RF generator, wherein the remote plasma system is connected to and in fluid communication with the processing region because plasma generation is useful in a variety of fabrication processes (column 1, rows 14-16) and located remotely for the purpose of allowing the aspect ratio of the processing chamber to be increased and improving process conditions, such as pumping speed, reaction product exhaust, control of the wall chemistry and the like (column 4, rows 7-21).
19. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a remote plasma system connected to and in fluid communication with each processing chamber in Turner et al. due to its usefulness in a variety of fabrication processes and to have the system located remotely in order to allow optimization of aspect ratio and process conditions as taught by Cecchi et al.
20. Claims 9, 12, 14-16, 22 and 62-63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al. as applied to claims 1-4 and 11 above, and further in view of U.S. Patent No. 5,310,410 to Begin et al.
21. Turner et al. disclose the invention of substantially as claimed and as described above.
22. However, Turner et al. fail to teach the apparatus comprising a high pressure deposition module connected to the one or more load lock chambers. Nor, do Turner et al. disclose second transfer chamber or a substrate handling member within the chamber.
23. Begin et al. disclose an apparatus for processing substrates in Figure 3, comprising a high pressure deposition module (38 and/or 40 and/or 42) connected (through the transfer chamber (14)) to one or more loadlock chambers for the purpose of performing processes which do not require vacuum, such as photolithography or etching (column 4, rows 27-35). By configuring the apparatus to include both vacuum chambers and high-pressure (atmosphere/non-vacuum) chambers, greater flexibility is provided in the types of operations that may be performed. The invention of Begin et al. further comprises a second set of processing chambers (80,82,84,100,102,104,106) and a second transfer chamber (72) so that wafers may be transferred between the first and second transfer chambers and may be processed in the chambers around these chambers. Both the high vacuum chambers and the additional transfer

chamber are provided for the purpose of greater flexibility in the types of operations performed (column 2, rows 38-43). Examiner uses Merriam-Webster's definition of a module--any in a series of standardized units for use together. Examiner notes that all the chambers of Begin et al. are connected to one another (although some are not directly adjacent). The connections are necessary for the wafer to travel throughout the system.

24. With respect to claims 62 and 63, an isolated processing region of each of said processing chambers and an interior region of said high pressure deposition region module are isolatable from and exterior environment in which said apparatus is situated. Isolation is provided by the chamber walls of the processing chambers and the walls of the high pressure deposition module and is inherent in the design of the chambers if both Turner et al. and Begin et al.

25. It would have been obvious to one of ordinary skill in the art the time the Applicant's invention was made to have provided a high deposition module connected to one or more loadlock chambers in order to perform processes which do not require vacuum, providing greater flexibility in the types of operations that may be performed as taught by Begin et al.

26. With respect to claims 62 and 63, an isolated processing region of each of said processing chambers and an interior region of said high pressure deposition region module are isolatable from and exterior environment in which said apparatus is situated. Isolation is provided by the chamber walls of the processing chambers and the walls of the high pressure deposition module.

27. Claim 10, 13 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al. and Begin et al. as applied to claims 9, 12, 14-16, 22 and 62-63 above, and further in view of U.S. Patent No. 5,612,082 to Azuma et al.

28. Turner et al. and Begin et al. disclose the invention substantially as claimed, including teaching the use of fabrication equipment including a plurality of chambers for performing different functions with varying vacuum conditions (column 1, row 52-column 2, row 5).

29. However, the prior art fails to teach a high pressure deposition module which is a spin-on dielectric module comprising one or more stripping chambers, one or more substrate spinner chambers, one or more curing chambers, and one or more silylation chambers.

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30. Azuma et al. disclose a method (Figure 1; columns 5, rows 34-39) for fabricating integrated circuit capacitors including metal oxide films of much higher quality and better electrical properties than prior art processes. The spin-on dielectric method includes fabrication processes, such as spinning (column 8, rows 12-13), curing (column 8, rows 24-26), stripping/oxidation (column 7, rows 39-44) and silylation (column 7, rows 55-57 and 58-60). Curing was defined as preparation or alteration by chemical or physical processing (Merriam-Webster Online Dictionary). This definition would include any type of heating.

31. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a high pressure module comprising the chambers described in the prior art in order to possess equipment with a plurality of chambers and capable of performing the differing functions necessary to produce a unique pattern of electrically conductive material as taught by Turner et al. and to have provided the specifically claimed chambers in order to fabricate a high quality film with better electrical properties as taught by Azuma et al.

32. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al. and Begin et al. as applied to claims 9, 12, 14-16, 22 and 62-63 above, and further in view of U.S. Patent No. U.S. Patent No. 6,214,120 to Kim.

33. Turner et al. and Begin et al. disclose the invention substantially as claimed.

34. However, the prior art fails to teach processing chamber comprising two isolated regions or each processing region including a gas distribution assembly disposed therein and each gas distribution assembly sharing process gases from one or more gas sources.

35. Kim discloses a processing chamber (Figure 2) comprising two processing regions, a gas distribution assembly (not numbered) in each region and each assembly sharing process gases from one or more sources for the purpose of configuring a machine with a small footprint and increased throughput, as compare to a single region system (column 1, rows 50-60).

36. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided an apparatus with two processing regions, a gas distribution assembly in

each region and each assembly sharing process gases form one or more sources in the prior art in order to configure a machine with a small footprint and increased throughput as taught by Kim.

37. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al. and Begin et al. as applied to claims 9, 12, 14-16, 22 and 62-63 above, and further in view of U.S. Patent No. 5,587,038 to Cecchi et al.

38. Turner et al. and Begin et al. disclose the invention substantially as claimed.

39. However, the prior art fails to teach the invention comprising a remote plasma system having an RF generator connected to and in fluid communication with each processing region.

40. Cecchi et al. teach the use of a remote plasma system in a processing chamber having an RF generator, wherein the remote plasma system is connected to and in fluid communication with the processing region because plasma generation is useful in a variety of fabrication processes (column 1, rows 14-16) and located remotely for the purpose of allowing the aspect ratio of the processing chamber to be increased and improving process conditions with regard to the pumping speed, reaction product exhaust, control of the wall chemistry and the like.

41. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a remote plasma system in the prior art due to its usefulness in a variety of fabrication processes and located remotely in order to allow optimization of aspect ratio and process conditions as taught by Cecchi et al.

42. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al., Begin et al. and Azuma et al. as applied to claim 10, 30 and 20 above, and further in view of U.S. Patent No. 5,587,038 to Cecchi et al.

43. Turner et al., Begin et al. and Azuma et al. disclose the invention substantially as claimed.

44. However, the prior art fails to teach the invention comprising a remote plasma system having an RF generator connected to and in fluid communication with each processing region.

45. Cecchi et al. teach the use of a remote plasma system in a processing chamber having an RF generator, wherein the remote plasma system is connected to and in fluid communication with the processing region because plasma generation is useful in a variety of fabrication processes (column 1,

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rows 14-16) and located remotely for the purpose of allowing the aspect ratio of the processing chamber to be increased and improving process conditions with regard to the pumping speed, reaction product exhaust, control of the wall chemistry and the like.

46. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a remote plasma system in the prior art due to its usefulness in a variety of fabrication processes and located remotely in order to allow optimization of aspect ratio and process conditions as taught by Cecchi et al.

Conclusion

47. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karla Moore whose telephone number is 703.305.3142. The examiner can normally be reached on Monday-Friday, 8:30am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 703.308.1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703.872.9310 for regular communications and 703.872.9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703.308.0661.

km
August 22, 2002


GREGORY MILLS
SUPERVISORY PATENT EXAMINER
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